Claims

What is claimed is:

1. An internal combustion engine machine incorporating significant improvements in power, efficiency and emissions control comprising:

A one or more cylinders, each having a head, a combustion chamber, a base, a compression chamber and a sidewall;

One or more means of igniting fuel in the cylinder(s);

One or more sources of intake air;

A means of storing and/or cooling lubricating oil between cycles of circulation;

A drive train;

A means of encasing, protecting, cooling and lubricating the drive train;

A means of segregating the oil in the sump and/or crankcase from the air or air/fuel mixture in the cylinder;

A means of dispersing oil on the cylinder walls and of then gathering excess for return to the oil sump;

A means of transmitting energy to and from the pistons;

A means of guiding each piston rod such that it moves in a linear manner, always along the same line;

A means of drawing air or air/fuel mixture into the engine machine, propelling it into the cylinder combustion chamber, compressing it for ignition and propelling its expulsion after ignition;

A means of admitting air and fuel, or air/fuel mixture into each cylinder;

A means of efficiently expelling exhaust gases resulting from combustion of the air fuel mixture after energy has been extracted;

A means of transmitting energy from the piston rod to the drive train;

A means of cooling the engine;

A means of transporting dispersing gathering and returning lubricating/cooling oil while keeping it segregated from combustion air and fuel;

2. An internal combustion engine machine as in claim 1 comprising a plurality of cylinders in one or more banks of two opposing cylinders each;

3. An engine machine as in claim 1 wherein the means of transmitting energy to and from the each piston is a piston-rod with a piston attached at one end, each piston rod passing through the base of its cylinder, carrying the force of its associated piston

power stroke to the drive train, the piston rod be linked to the drive shaft by a push rod in the crankcase/oil sump, propelling a transmission mechanism, such as a crank-plate or other rotary or linier device powering a drive shaft;

4. An engine machine as in claim 1 wherein the means of cooling the engine is via exhaust gas expansion, cooling fins on the engine machine and via a large volume of oil circulated through the cylinders and pooled in the sump, the sump acting as a heat sink for oil circulating from the cylinders;

5. An engine machine as in claim 1 wherein the means of transmitting energy from the piston rod to the drive train is a rotary deice, such as a crank plate, linked to the piston rod by a push rod;

6. The engine machine in claim 1 in which the means of transmitting energy from the piston rod to the drive train is, such as a rack and pinion transmission system, segmented gear drive, or a ratchet device;

7. An engine machine as in claim 1 wherein the means of admitting air or air/fuel mixture into each cylinder is a "pop-top" piston comprising a valve in the piston head that opens to admit new air or fuel/air mixture on each cycle, thus eliminating the need for conventional air or air/fuel intake port(s) in the cylinder side wall;

8. An engine machine as in claim 1 wherein the means of admitting the fuel component of the air/fuel mixture into each cylinder is via a fuel injector for each cylinder;

9. An engine machine as in claim 1 wherein the means of admitting air or air/fuel mixture into each cylinder obtained by intake ports in the sidewall of each cylinder;

10. An engine machine as in claim 1 wherein the means of efficiently expelling exhaust gases upon completion of combustion and energy extraction is a cylinder head exhaust valve, allowing exhaust to exit through the head of the cylinder.

11. An engine machine as in claim 1 wherein the means of drawing air or air/fuel mixture into the system, propelling it into the cylinder combustion chamber, compressing it for ignition and expelling it after ignition is a "multi-function piston" that draws air or air/fuel mixture from the intake source and into the compression chamber beneath the piston on an up stroke and propels it out of the compression chamber into the cylinder combustion chamber above the piston on a down stroke, and on the immediately subsequent upstroke, compresses the air or air/fuel mixture in the combustion chamber, then, upon combustion and expels the exhaust;

12. An engine machine as in claim 1 wherein the means of guiding each piston rod such that it moves in a linear manner, always along the same line is the compression wall and the piston rod compression seal serving as a piston rod guide to hold each pistons in correct position within its cylinder;

13. An engine machine as in claim 1 wherein there is provided for each cylinder, a multi-function piston performing four "drive" functions plus lubrication, the "drive" functions being to (1) draw in new air or air/fuel mixture into the intake chamber (2) propel the new air or air/fuel mixture into the combustion chamber (3) compress the air/fuel mixture in the cylinder combustion chamber, (4) receive the force of combustion

for the power stroke for transmission to the piston rod, and (5) receive, disperse and recoup lubricating oil for return to the oil sump/cooler;

14. An engine machine as in claim 1 wherein the means of dispersing oil on the cylinder walls and of then gathering excess for return to the oil sump is oil hoarding rings, these rings located near the head and base of each piston, such that they contain any oil dispersed between them, and when in motion, push said oil before them, substantially wiping it off the cylinder walls and leaving only a fine film behind as they move;

15. An engine machine as in claim 1 wherein the means of segregating the oil in the sump and/or crank case from the air or air/fuel mixture in the cylinder is in the form of a compression wall and piston rod pressure seal at the base of each cylinder, the compression wall segregating the fuel and air in the cylinder from the lubricating/cooling oil in the oil sump/crankcase, thus creating a segregated and sealed intake chamber into which the air or fuel/air mixture is first received from the carburetor or breather and from which it is discharged into the cylinder combustion chamber, the piston rod passing through the compression wall at the base of each corresponding cylinder and into the sump/crankcase by way of the compression wall and pressure seal;

16. An engine machine as in claim 1 wherein the means of encasing, protecting, and lubricating the drive train is a combination crankcase/oil sump;

17. An engine machine as in claim 1 wherein the means of storing and/or cooling the oil between cycles of circulation is a combination crankcase/oil sump;

18. An engine machine as in claim 1 wherein the source of intake air is a carburetor;

19. An engine machine as in claim 1 wherein the means of igniting the fuel is an electrical spark;

20. An engine machine as in claim 1 wherein, the means of transporting, dispersing, gathering and returning lubricating/cooling oil while keeping it segregated from combustion air and fuel is a dynamic force lubricating oil pump comprising a piston rod/lubrication assembly that serves as both a means of transmitting force to and from the piston and as a means to transmit lubricating/cooling oil to its cylinder via a multi-function piston, the assembly comprising a piston rod with a multi-function piston attached to each end and oil pick-up and exhaust ports in its mid section, and oil transport passages in the piston rod from the oil pick-up nozzles to the multi-function piston assembly and back to the oil exhaust ports, the piston assembly having a multi-function piston configured with one or more radially situated oil inlet and outlet ports that distribute lubricating oil to the associated cylinder and recovers the oil for return to the sump/crankcase, using oil hoarding rings near each piston head and base to assist in dispersing and then re-gathering the oil for return to the cooling sump such that oil flows through the piston rod and piston, and around the piston, lubricating and cooling piston walls, piston rings and cylinder walls, and returns through the piston and piston rod to the oil sump/crank case for cooling, the piston rod and drive train being lubricated by splash distribution in the crank-case/oil sump;

21. An engine machine as in claim 1 wherein a means of collecting, storing, and transferring inertial energy from one drive stroke to another is provided in the form of a

fly-wheel, thereby helping to facilitate compression strokes and reducing overall engine vibration;

22. An engine machine as in claim 1 wherein a wrist pin links each piston to its piston rod, rendering the combination less rigid;

23. An engine machine as in claim 1 wherein the means of igniting fuel in the cylinders comprises explosive compression in the cylinder head;

24. An engine machine as in claim 1 wherein means of igniting fuel in the cylinders comprises a glow plug.

25. An engine machine as in claim 2 wherein the means of transmitting energy to and from the pistons is a piston-rod between and joining each pair of pistons in each cylinder bank such that each piston rod has a piston at each end, the piston rod passing through the bases of each associated cylinder, each piston rod carrying the force of each piston power stroke to the drive train, and across to the opposite associated piston to power that piston's compression stroke, the piston rod to be linked to the drive shaft by a push rod in the crankcase/oil sump, propelling a crank-plate or other rotary or linier transmission device that is geared to the drive shaft;

26. An engine machine as in claim 2 wherein there is a plurality of banks of cylinders, each bank comprised of two or more cylinders and the drive train of each bank joined to the drive train of its neighboring bank(s) in such a way that each bank may be independently disconnected from its neighbor(s) and shut down automatically or at the

discretion of the operator, the manner of joining the bank drive trains being, in example, manual clutch(es), centrifugal clutch(es), or ratchet devices.